

**Project Title:** Water Conservation Practices for Michigan Container Nurseries

**Project #MDAHF** – 2006-09

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**Reporting Period:** June 2007-January 2008

### Accomplishments During Reporting Period

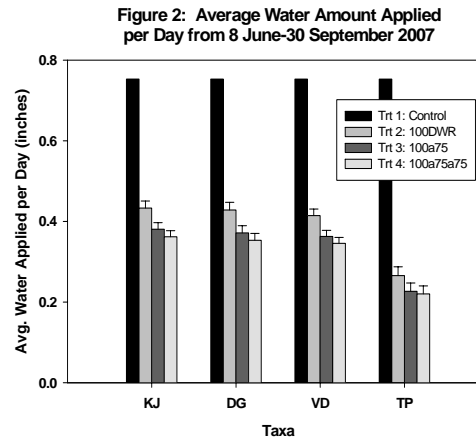
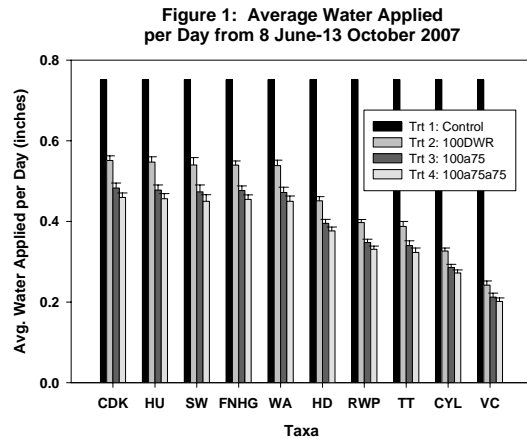
The objective of the continuing experiment is to quantify the daily water requirement (DWR) of container-grown woody ornamentals so that irrigation can be applied according to plant demand. This will allow growers to minimize over-watering and group plants with similar DWR together in order to conserve water and reduce runoff. Such practices will help growers comply with Public Act 148 (2003) and Public Act 35 (2006) that require heavy water users to report water use, conservation practices, and implementation plans to the MDA, as well as prepare for future legislation regarding water use.

The experiment from 2006 was repeated for 2007 with 10 different taxa of landscape shrubs (Table 1). Volumetric moisture content was measured with a ThetaProbe half hour after irrigation and prior to irrigation the following day with DWR equal to the difference between the two measurements. Irrigation treatments were 1. control of 0.75 inches per day, 2. irrigation applied to replace 100% DWR, 3. irrigation applications of 100% DWR one day alternating with 75% DWR the following day, 4. irrigation applied on a three day cycle of 100%-75%-75% DWR. Plant response to irrigation treatments was evaluated by measuring: growth index, every two weeks June-August and monthly through October; monthly gas exchange of *Hydrangea arborescens* 'Dardom', *Spiraea fritschiana* 'Wilma', and *Viburnum x burkwoodii* 'Chenaultii'; pH and electrical conductivity of the same taxa, every two weeks June-August and monthly through October; foliar nutrient analysis of the same taxa; leaf area; and internode length.

In addition a data logger was set up to measure volumetric moisture content and substrate temperature of one *S. fritschiana* 'Wilma' per irrigation block (12 total, 3 per treatment) every 60 seconds throughout the summer. Net radiation, relative humidity, and air temperature were also recorded over the nursery production area.

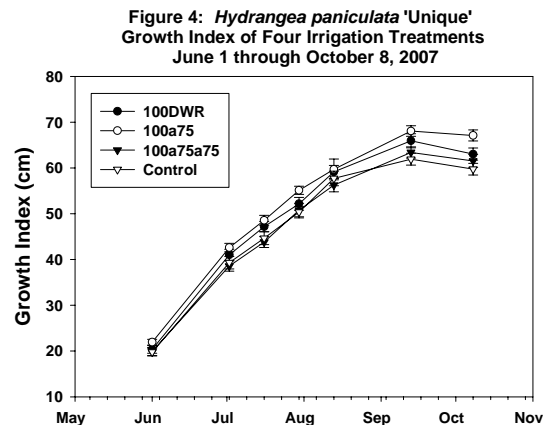
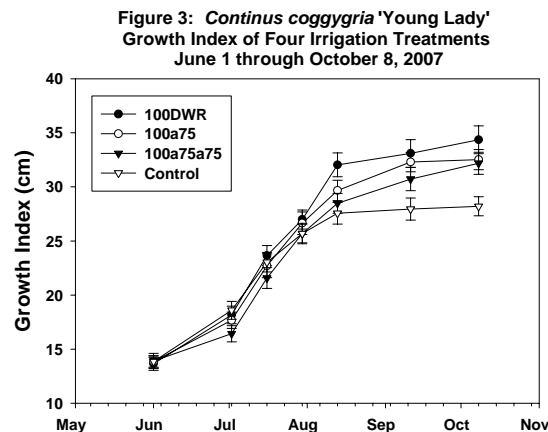
An irrigation runoff experiment using the same irrigation treatments as 2006 was conducted using four taxa from 2006: *Deutzia gracilis* 'Duncan', *Kerria japonica* 'Albiflora', *Thuja plicata* 'Atrovirens', and *Viburnum dentatum* 'Ralph Senior' (abbreviated DG, KJ, TP, and VD in figures). This will allow a second growing season of water use to be recorded for these plants. Volume of runoff water was collected 4 times during 2007 and analyzed for nitrate and phosphorous. Growth index, pH, and electrical conductivity were also collected. Comparisons will be made between treatments to determine the extent of nutrient leaching and runoff reductions of DWR irrigation compared to a traditional irrigation rate of 0.75 inches per day.

Table 1. 2007 Taxa	Abr.	Taxa	Abr.
<i>Caryopteris x clandonensis</i> 'Dark Knight'	CDK	<i>Rosa</i> 'Winnipeg Parks'	RWP
<i>Cotinus coggygria</i> 'Young Lady'	CYL	<i>Spiraea fritschiana</i> 'Wilma'	SW
<i>Forsythia x</i> 'New Hampshire Gold'	FNHG	<i>Thuja occidentalis</i> 'Techny'	TT
<i>Hydrangea arborescens</i> 'Dardom'	HD	<i>Viburnum x burkwoodii</i> 'Chenaultii'	VC
<i>Hydrangea paniculata</i> 'Unique'	HU	<i>Weigela florida</i> 'Alexandra'	WA



Average water applied per day according to DWR was less than the control treatment of 0.75 inches per day for all taxa in the 2007 irrigation study (Figure 1). Water was also conserved for the four taxa grown under the same irrigation treatments in the runoff collection experiment (Figure 2).

Growth index increase between the four treatments was not significantly different for 8 out of the 10 taxa. Growth index increase was significantly different between the 100DWR and Control treatment for *Cotinus coggygia* 'Young Lady' and between the 100a75 and Control for *Hydrangea paniculata* 'Unique'. Growth index of these two cultivars is shown in figures 3 and 4.



Results thus far support that irrigating according to daily water requirement by scheduling irrigation applications by measuring changes in volumetric moisture content can conserve water and produce plants with the same and/or larger growth indices.

### Planned Activities for Next Reporting Period

Data analysis for 2007 data and model generation using all data will be completed. Models will attempt to use weather data to determine irrigation schedules to eliminate or reduce need for direct measure of plant water use. Projects will be set up with grower cooperators to evaluate scheduling at actual nurseries.

**Other Funding/Contributions:** Project GREEN FY06&FY07 \$57000; Spring Meadow Nursery 2006-2008 \$6200; Renewed Earth 2006-2008 \$2400; Harrell's Inc. 2006-2008 \$1000.

**Publications/Outreach:** Nine presentations have been made to industry groups related to this project in 2006-7 and one presentation at the American Society for Horticultural Science 2007 conference. Data will be analyzed and prepared for publication in refereed journals during from January through June 2008.